

# WEEKLY CLIMATE BULLETIN

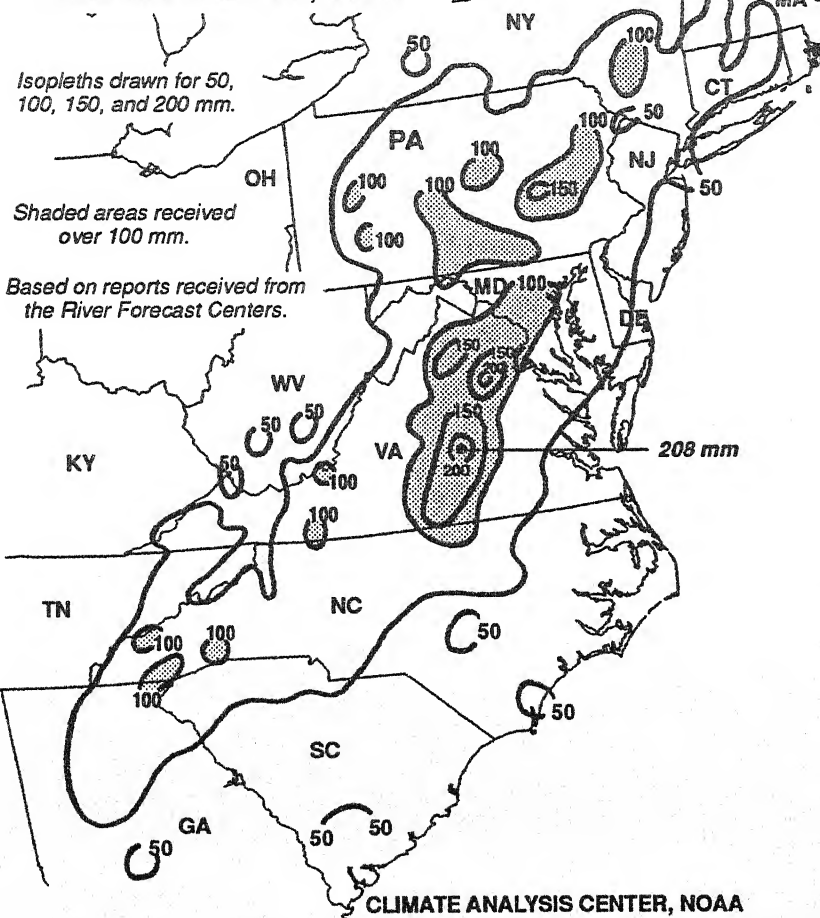
No. 93/48

Washington, DC

December 1, 1993

## TOTAL PRECIPITATION

November 26 - 28, 1993



**TORRENTIAL DOWNPOURS DRENCH PARTS OF THE EAST, GENERATING LOCALIZED FLOODING.** Early in the week, a large, deep, slow-moving storm complex got organized over the Rockies and began tracking slowly eastward. As much as 60 cm of snow buried portions of the Rockies and the Dakotas while a widespread area of mixed precipitation afflicted the central and southern Plains and the upper and middle Mississippi Valley. The early-season winter storm caused innumerable air, rail, and road transportation difficulties during the Thanksgiving holiday travel rush. During the next few days, the system tapped tropical moisture as it crept eastward, producing a large area of heavy precipitation that inundated the central and southern Appalachians, the mid-Atlantic, and southern New England with up to 208 mm of rain, most of which fell within 24 hours. Washington National Airport recorded its largest 24-hour total (102 mm) in over 17 years as cloudbursts engendered large, rapid rises on numerous rivers and streams. Localized flooding resulted, forcing evacuations in communities near York, PA and Lancaster, PA. In addition, street flooding forced a major highway to close for eight hours in central Maryland while powerful wind gusts approaching hurricane force downed trees and power lines in southern New England, leaving over 26,000 households temporarily without electricity, according to press reports. Farther west, wintry weather lingered in parts of the Great Lakes with 12-28 cm of lake-effect snow blanketing parts of the Chicago, IL and Milwaukee, WI areas on Sunday, causing more air and road travel delays.



UNITED STATES DEPARTMENT OF COMMERCE  
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION  
NATIONAL WEATHER SERVICE-NATIONAL METEOROLOGICAL CENTER  
**CLIMATE ANALYSIS CENTER**





# GLOBAL CLIMATE HIGHLIGHTS

## MAJOR CLIMATIC EVENTS AND ANOMALIES AS OF NOVEMBER 27, 1993

### 1. West-Central North America:

#### STILL DRIER THAN NORMAL.

Although 30 to 80 mm of precipitation fell on the western half of Washington and scattered totals of up to 40 mm were recorded elsewhere, six-week moisture shortages remained in the 200 to 280 mm range [14 weeks].

### 2. Central and Eastern North America:

#### HEAVY SNOWS IN CENTRAL STATES, ABUNDANT RAINS IN EAST AND ACROSS CUBA.

A powerful, slow-moving, upper level storm tracked through the eastern two-thirds of the United States last week, accompanied by very heavy precipitation and leaving record cold in its wake. As much as 60 cm of snow buried the Dakotas, and freezing or frozen precipitation throughout the Plains forced widespread travel delays, according to press reports. In addition, temperatures averaged 10°C to 13°C below normal across the north-central states. Arctic air plunged southward to Texas, where record lows followed a severe ice storm in northern and central parts of the state. To the east, torrential rains inundated much of the mid-Atlantic, with 75 to 210 mm measured within 24 hours from the Carolinas to New England, causing some river, stream, and urban flooding. Farther south, 100 to 250 mm of rain inundated Cuba earlier in the week, with unofficial reports of up to 700 mm in 72 hours on parts of Guantanamo. According to press reports, resultant flooding claimed over a dozen lives and left 50,000 individuals homeless [Episodic Events].

### 3. East-Central South America:

#### UNUSUALLY WET WEATHER DEVELOPS.

Up to 180 mm of rain fell on Uruguay as unusually wet conditions spread across the region. Six-week moisture surpluses ranged from 200 to 280 mm [WET - 6 weeks].

### 4. Europe:

#### COLD AND DRY CONDITIONS PERSIST.

Snow fell as far south as central Italy, and temperatures averaged as much as 10°C below normal across most of Europe and western Russia [COLD - 3 weeks]. Although southern Scandinavia received 30 to 60 mm of precipitation, most other areas reported less than 20 mm, and six-week moisture shortages ranged from 50 to 260 mm [DRY - 6 weeks].

### 5. Greece:

#### MORE HEAVY PRECIPITATION.

According to press reports, heavy snows isolated mountain villages and cut off traffic across northern Greece while up to 100 mm of rain drenched southern Greece early in the week. Conditions, however, improved as the week progressed [Episodic Events].

### 6. Morocco:

#### DRIER CONDITIONS PREVAIL.

Although scattered showers yielded 40 to 60 mm of rain, most of the country received less than 20 mm, and six-week moisture surpluses dropped below 180 mm [WET - Ended at 12 weeks].

### 7. Western and Central Asia:

#### COLD WEATHER COVERS EXTENSIVE AREAS.

In Siberia, minimum temperatures plummeted to -50°C and wind chills dipped below -70°C as a number of individuals succumbed to exposure, according to press reports. Weekly temperature departures reached -14°C in parts of the Commonwealth of Independent States and -12°C in northwestern China [COLD - 6 weeks].

### 8. Taiwan:

#### PROLONGED DRYNESS CONTINUES.

Although 70 mm of rain fell at a few locations, most of the island received only 20 to 30 mm, and six-week moisture shortages remained near 220 mm [DRY - 24 weeks].

### 9. Indochina Peninsula:

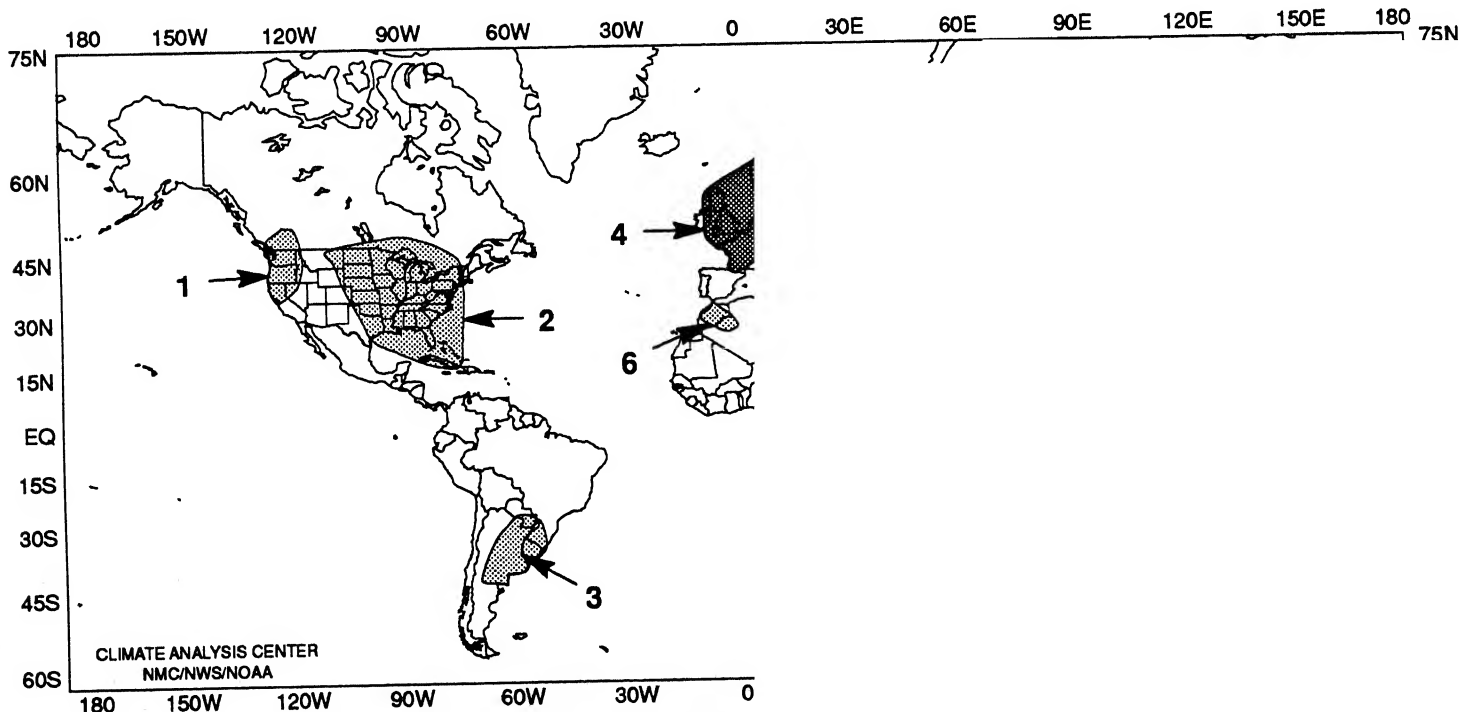
#### TYPHOON KYLE PUNCTUATES A WET WEEK.

Widespread rains of 100 to 350 mm, much of which fell as Typhoon Kyle tracked into the region, caused severe flooding in Vietnam and northern Thailand, according to press reports. Floodwaters interrupted rail traffic across Thailand and took dozens of lives in Vietnam [Episodic Events].

### 10. Southeastern Australia:

#### WET SPELL ENDS.

Little or no rain was reported across the region as the moisture surpluses decreased [WET - Ended at 12 weeks].

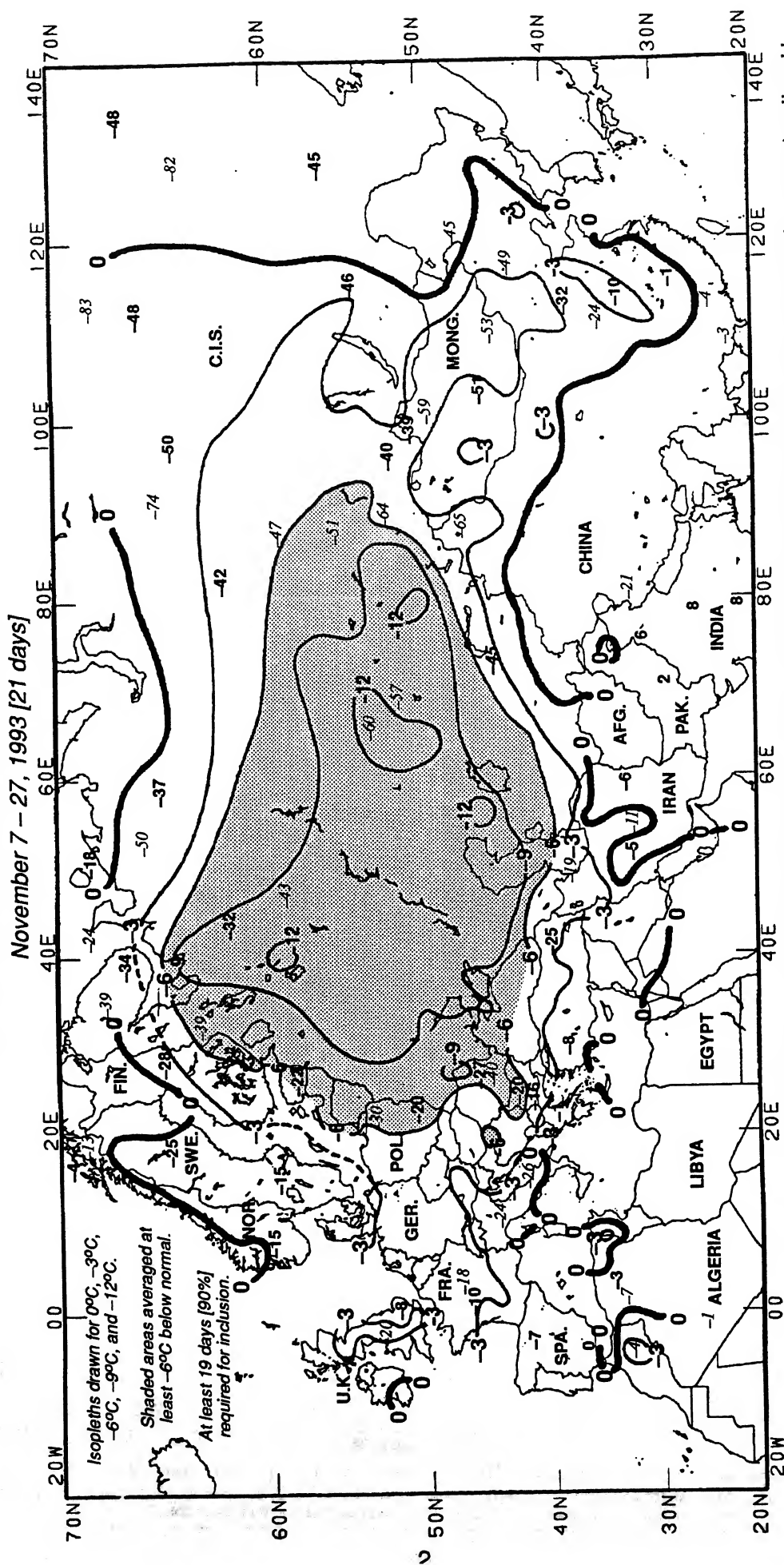


#### EXPLAN

TEXT: Approximate duration of anomalies is in brackets. Precipitation  
MAP: Approximate locations of major anomalies and episodic events  
temperature anomalies, four week precipitation anomalies, long

# GLOBAL CLIMATE HIGHLIGHTS FEATURE

CONTOURS: DEPARTURE FROM NORMAL TEMPERATURE (°C)  
 PLOTTED: SELECTED EXTREME MINIMUM TEMPERATURES (°C, BOLD) and  
 SELECTED EXTREME MINIMUM WIND CHILLS (°C, *ITALICS*)



**EARLY-SEASON OUTBREAK OF BITTERLY COLD AIR GRIPS PARTS OF EUROPE, ASIA, AND AFRICA.** Beginning in early November, exceptionally cold conditions afflicted portions of Eurasia and Africa. From eastern Europe eastward to western Siberia, temperatures averaged well below normal throughout the past three weeks, producing departures of -6°C to -14°C for the November 7 - 27 period. Elsewhere, exceedingly cold weather was less persistent, but of similar magnitude. Lows plunged to -50°C in parts of northern Russia and central Mongolia while readings down to -20°C were recorded as far south as Bulgaria, northeastern Turkey, and central China. Subfreezing readings were observed in parts of northern Algeria, central Iran, and China's Yangtze River Valley, and single-digit lows (8°C) reached southward to central India. Strong winds accompanied the cold air in some places, producing wind chills as low as -83°C in northeastern Russia, -40°C in southeastern Romania and northeastern China, and -1°C in southwestern Algeria. According to press reports, more than three dozen individuals perished across Europe and Russia from exposure, and early-season snow caused transportation delays in scattered areas from London, U.K. southeastward to northern Greece early last week.

# UNITED STATES WEEKLY CLIMATE HIGHLIGHTS

## FOR THE WEEK OF NOVEMBER 21 – 27, 1993

A massive storm complex trekked across the nation during the week, producing blizzard conditions from the Pacific Northwest eastward to the upper Great Lakes and southeastward to the central High Plains, spreading widespread freezing or frozen precipitation across the central and southern Great Plains, and generating slow-moving storms that inundated much of the central and southern Appalachians with up to eight inches of rain in 24 hours. Early in the week, the system brought high wind, frigid temperatures, and heavy snow from the Pacific Northwest through the northern Rockies, causing power outages for nearly 4,000 customers in the Seattle suburbs and dumping up to a foot of snow on the higher elevations of Montana. On Monday, low visibility and slippery roads resulting from heavy snow triggered an 86-vehicle chain-reaction accident on Interstate 90 near Spokane, WA. At least 34 people were hurt in the mile-long pileup, according to press reports. On Tuesday, the storm was responsible for seven injuries in a 41-vehicle collision near Bountiful, UT, and the Colorado State Patrol reported around 100 accidents on icy, snow-covered highways in the Denver area. On Wednesday, the storm disrupted Thanksgiving Eve travel at Denver's Stapleton airport as snow, ice pellets, freezing rain, and bitterly cold air gripped the central Rockies, northern and central Plains, and upper Mississippi Valley. On Thursday and Friday, flights were canceled at both Dallas-Fort Worth International Airport and Chicago's O'Hare Airport due to a wintry mixture of precipitation. Elsewhere, icy roads were blamed for numerous accidents and at least nine traffic fatalities in Missouri, Illinois, Iowa, and Wisconsin, according to press reports. On Saturday, the storm tapped tropical moisture and spread heavy rain and high wind across the East. Streams, creeks, and rivers overflowed in central Pennsylvania, forcing evacuations in communities near Lancaster and York as daily totals between four and eight inches were common across the mid-Atlantic. Farther north, wind-toppled trees in southern New England knocked out electricity for 26,000 customers. In sharp contrast, continued dry weather across the Far West engendered a 400-acre forest fire near Fort Ross in northern California. Firefighters were able to contain much of the blaze by Saturday night with the help of some light rain. Still, the 1993-1994 wet season has gotten off to a slow start throughout the Far West, with seasonal totals (since September 1) well under half of normal at most locations. In southern California, a wildfire in Anaheim Hills, fanned by 20 mph winds, destroyed 20 condominiums, causing an estimated \$2 million in damage.

At the start of the week, the aforementioned system pushed southward out of Canada, bringing winter-like weather and high wind from the northern Pacific Coast to the upper Great Lakes. Snow blanketed the higher elevations of the Pacific Northwest and northern Rockies as much colder air moved into the upper Missouri and upper Mississippi Valleys and northern Plains. Elsewhere, locally heavy rain fell along the southeastern coast of Florida, with over four inches drenching parts of West Palm Beach. Farther north, a major Alaskan storm brought blizzard conditions to the Seward Peninsula and lower Kobuk Valley. By Tuesday, as the primary frontal system drifted eastward, locally heavy snow spread over the Rockies and northern High Plains as Arctic air plunged southward into the Great Plains behind the system, now centered over Iowa. Temperatures plummeted 45°F

in six hours at Clayton, NM, on Tuesday after the passage of the storm's trailing cold front.

At mid-week, the cold front continued to plunge southeastward into the southern Plains and the middle and lower Mississippi Valley. Precipitation remained widespread from the Pacific Northwest and northern Rockies eastward to the Great Lakes and the middle Mississippi Valley, with heavy snow (as much as two feet) over the northern Plains. Unseasonably cold air settled farther west, with nearly a dozen daily record lows set from northern California and southern Oregon eastward to the middle Missouri Valley. During the latter part of the week, the storm complex moved eastward, spreading moderate to heavy rain over the lower Mississippi and Ohio Valleys and Great Lakes, with snow continuing over the middle and upper Mississippi Valleys and northern Plains. Cold air continued to surge into the central United States, with a dozen more new daily low temperature records established in the central and southern Plains and Mississippi Valley on Thursday and two and a half dozen on Friday. At week's end, the frontal system was drifting through the Atlantic Coast states, generating torrential rains that caused flash flooding in the central and southern Appalachians and mid-Atlantic while hurricane wind gusts and heavy surf pounded the middle and southern Atlantic Coast. Behind the massive system, light snow and frigid air lingered over portions of the middle Missouri and upper and middle Mississippi Valleys.

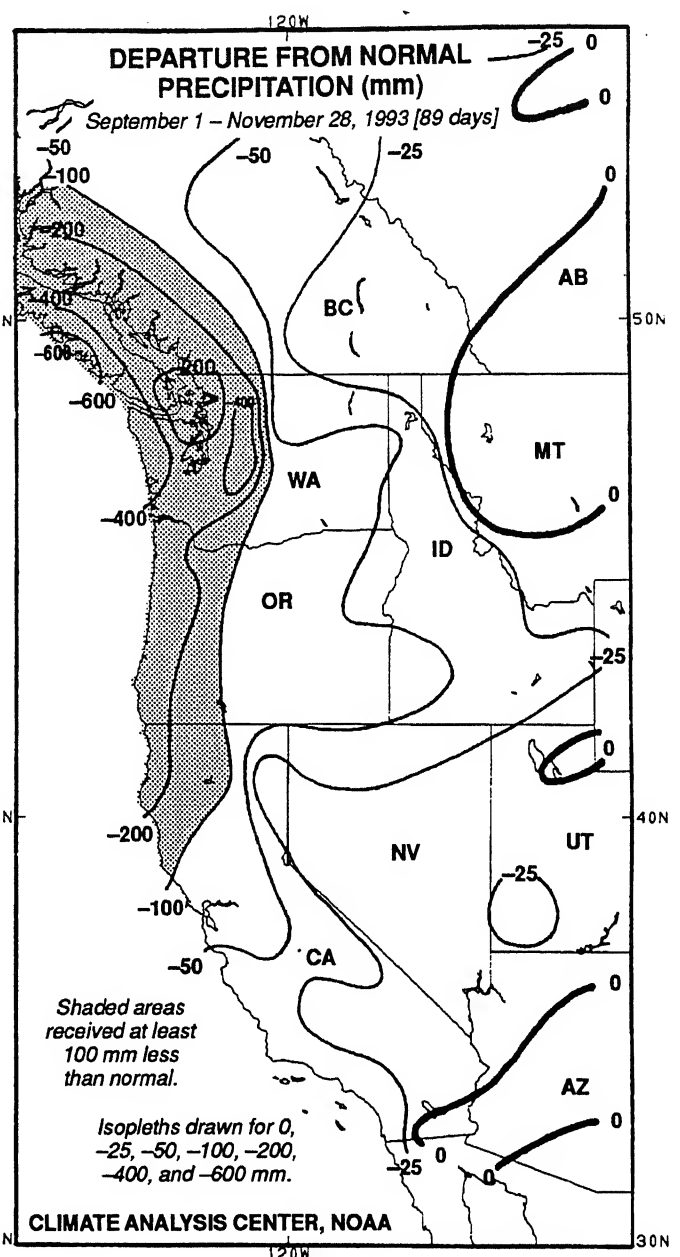
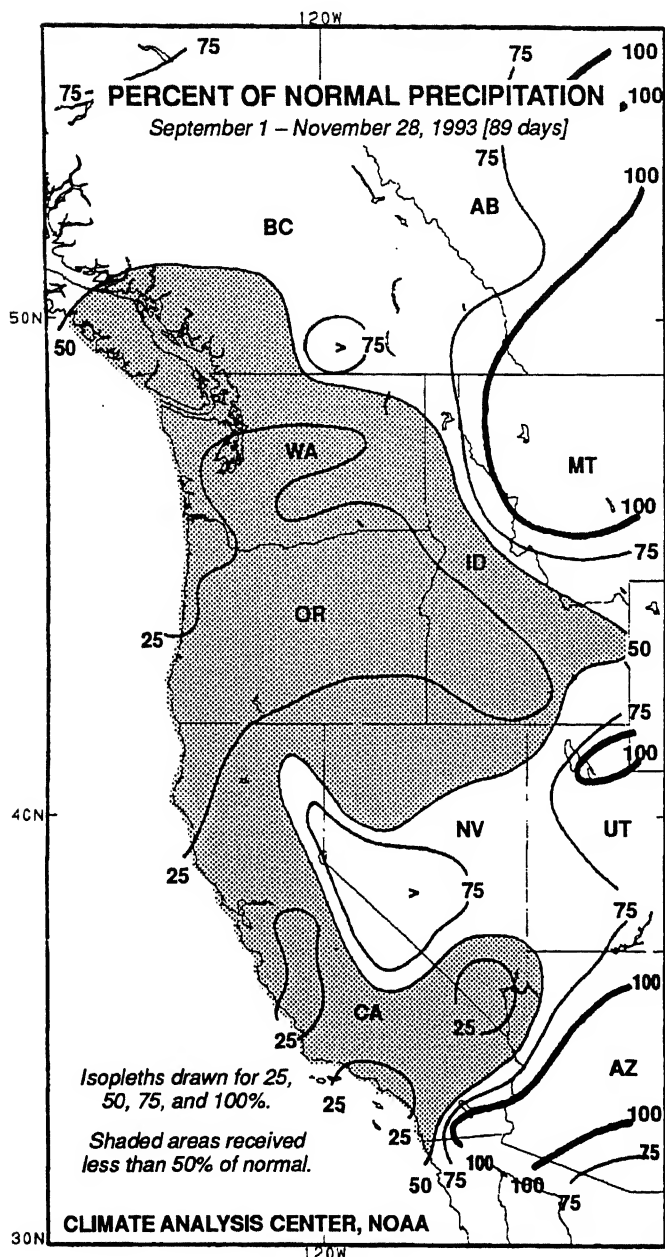
According to the River Forecast Centers, the greatest weekly precipitation totals (between from two and eight inches) fell on the southern and central Appalachians, the Piedmont, and adjacent portions of the southern and middle Atlantic Coastal Plain. Scattered totals of two or more inches were also recorded across the Southeast, the lower Mississippi Valley, the Northeast, the northern Cascades, and southeastern Alaska. Light to moderate amounts were reported in the northern and southeastern Plains, the Rockies, the Southwest, northern California, Hawaii, and the remainders of the Pacific Northwest, Alaska, and the eastern half of the nation. Little or no precipitation fell on southern California, the Great Basin, and much of the central and southern High Plains.

Warmer than normal conditions in the contiguous United States prevailed over the southern portions of the Great Lakes, the eastern middle Mississippi and Ohio Valleys, the southern Atlantic Coast states, southern Arizona, and the immediate southern California Coast. Weekly departures of +4°F to +8°F were observed in the middle and upper Ohio Valley, along the southern Atlantic Seaboard, and across the Florida peninsula. Above normal temperatures also dominated much of Alaska, with weekly departures reaching +11°F at Gulkana.

Unseasonably cool weather overspread the remainder of the nation, with weekly departures below -8°F reported across the Pacific Northwest, the Great Basin, the Rockies, and the Great Plains. Temperatures averaged as much as 23°F below normal in the northern Rockies. In Alaska, colder than normal conditions were limited to scattered northern portions and to the extreme southern Panhandle. Temperatures also averaged two or three degrees below normal across Hawaii.



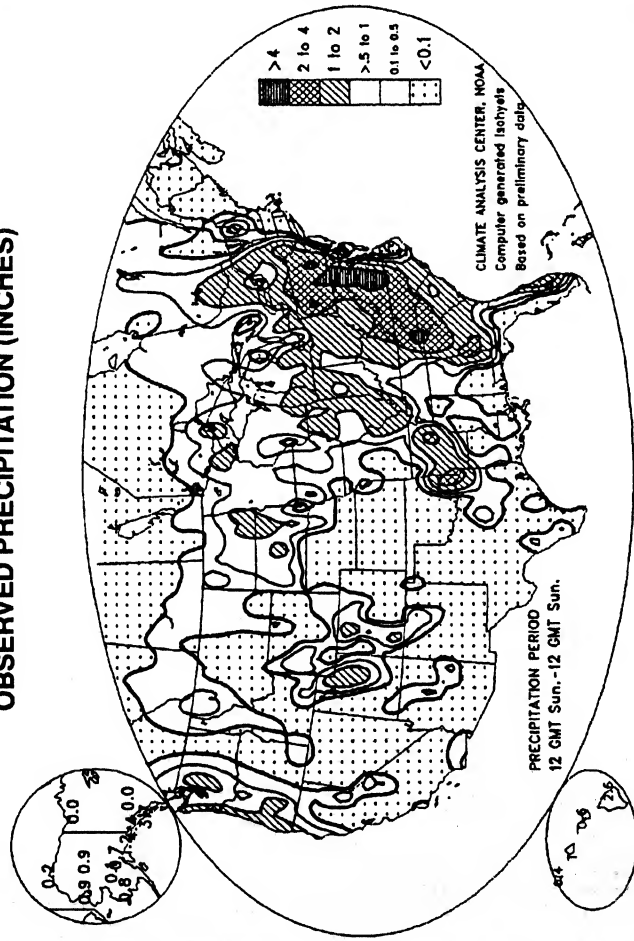
# NORTH AMERICAN CLIMATE HIGHLIGHTS FEATURE



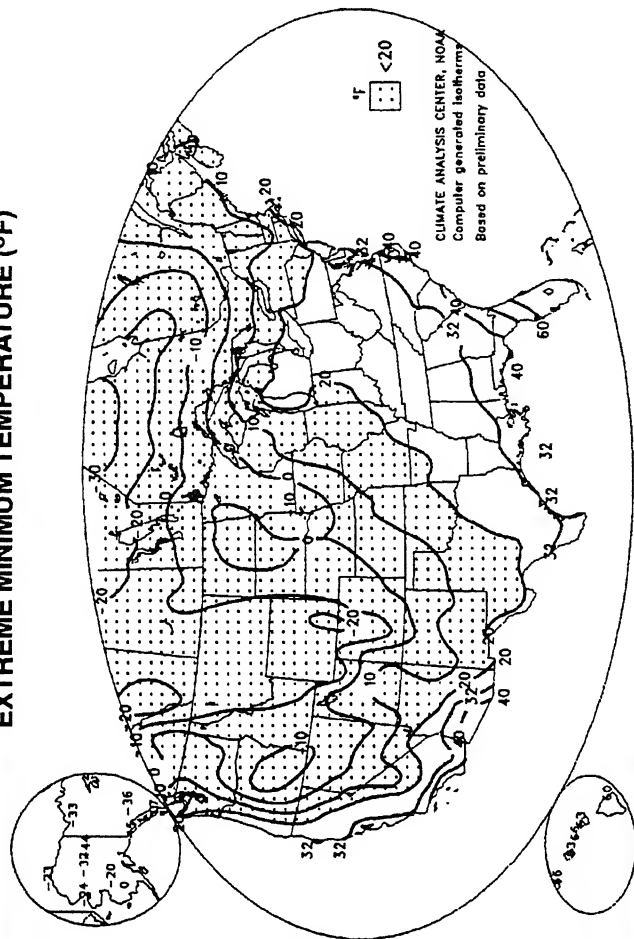
**A SLOW START TO THE 1993 – 1994 WET SEASON ACROSS THE FAR WEST.** Last week, 30 – 65 mm of precipitation fell on parts of Vancouver Island and the western half of Washington while 10 – 40 mm dampened the western third of Oregon and extreme northwestern California. Elsewhere, little or no precipitation was recorded. These totals represent near to well below normal weekly amounts for late November, continuing the region's slow start to the 1993 – 1994 wet season. Most locations across the northern Intermountain West, the northern Great Basin, the West Coast, and southwestern Canada received less than half of normal precipitation since September 1, with large sections of Washington, Oregon, Idaho, California, and southern Nevada reporting only 10% – 25% of typical totals. Accumulated deficits exceed 50 mm through the northern Cascades, the northern half of the West Coast, and the western half of southern British Columbia, with moisture shortages of 400 – 650 mm measured where normals are higher (on much of Vancouver Island, along Washington's immediate western coastline, and in parts of the northern Cascades). The combination of heavy precipitation during the 1992 – 1993 wet season and an abnormally cool and damp Spring and early Summer promoted unusually heavy grass and shrub growth. The region's subsequent subnormal precipitation has dried out this undergrowth, providing ideal fuel for wildfires. Large fires seared numerous dwellings in southern California in late October and early November, and last week smaller, short-lived fires destroyed a few buildings near Anaheim, CA and scorched part of northern California.

# UNITED STATES WEEKLY CLIMATE CONDITIONS (November 21 – 27, 1993)

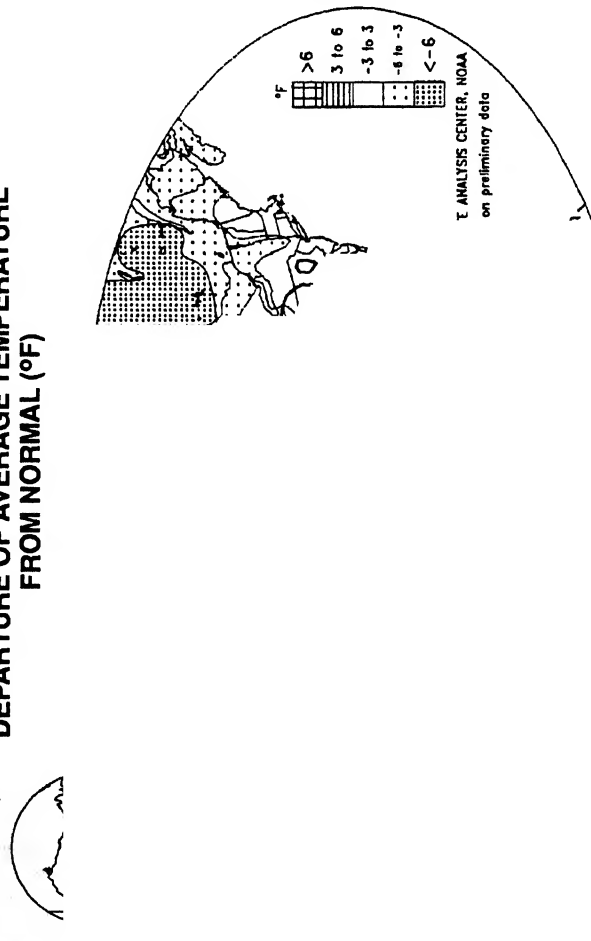
OBSERVED PRECIPITATION (INCHES)



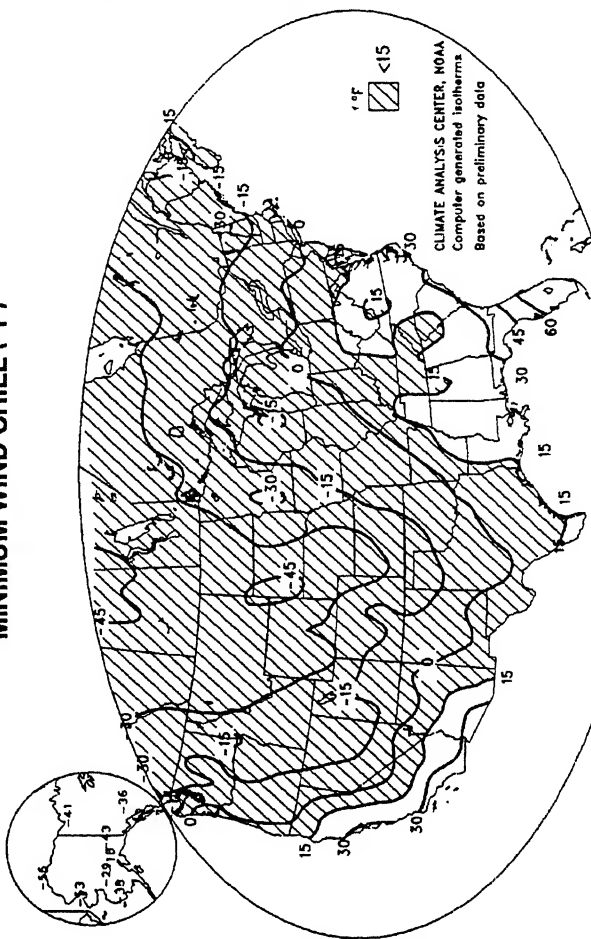
EXTREME MINIMUM TEMPERATURE (°F)



DEPARTURE OF AVERAGE TEMPERATURE  
FROM NORMAL (°F)

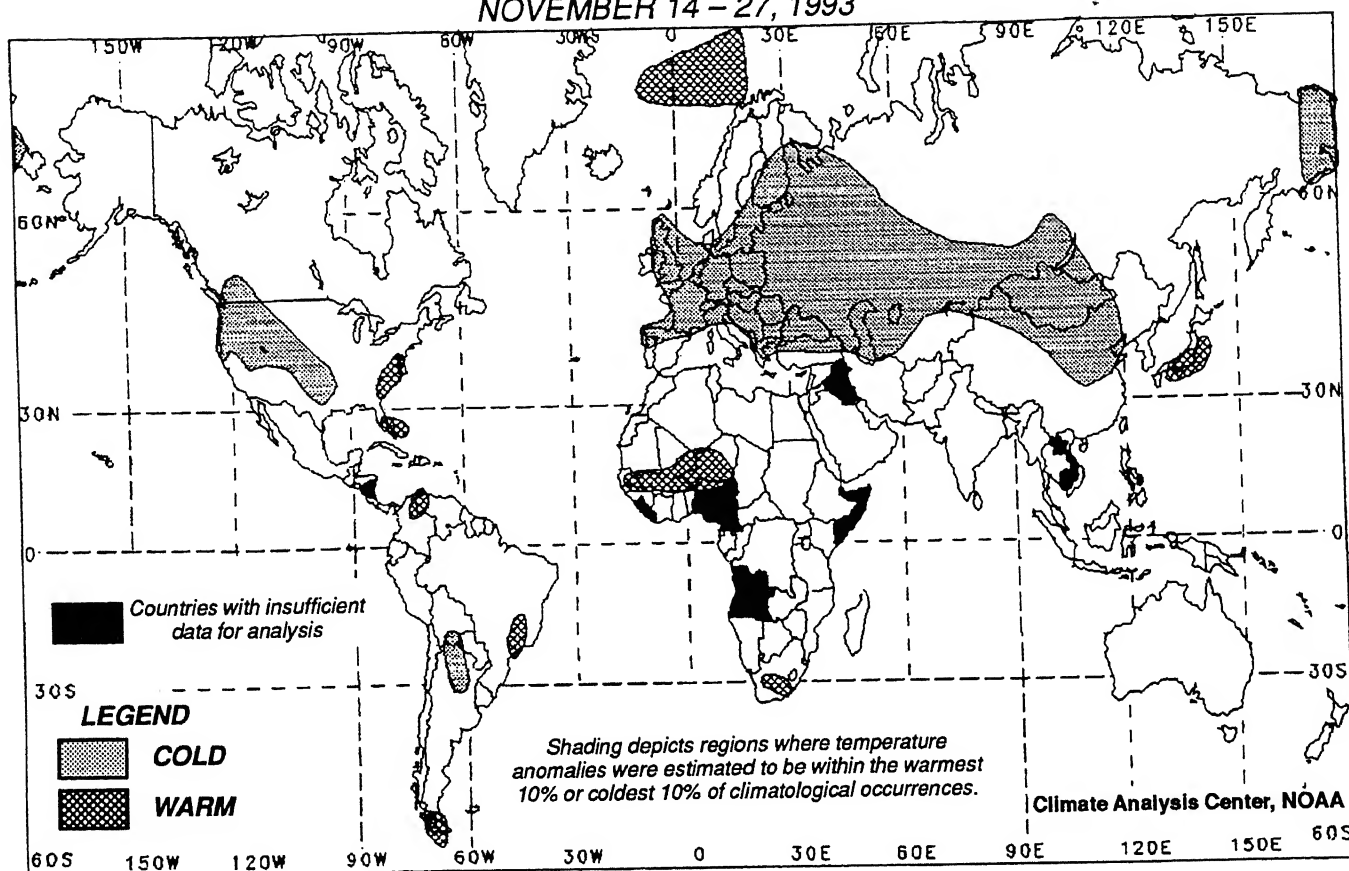


MINIMUM WIND CHILL (°F)



## TWO-WEEK GLOBAL TEMPERATURE ANOMALIES

NOVEMBER 14 – 27, 1993



## FOUR-WEEK GLOBAL PRECIPITATION ANOMALIES

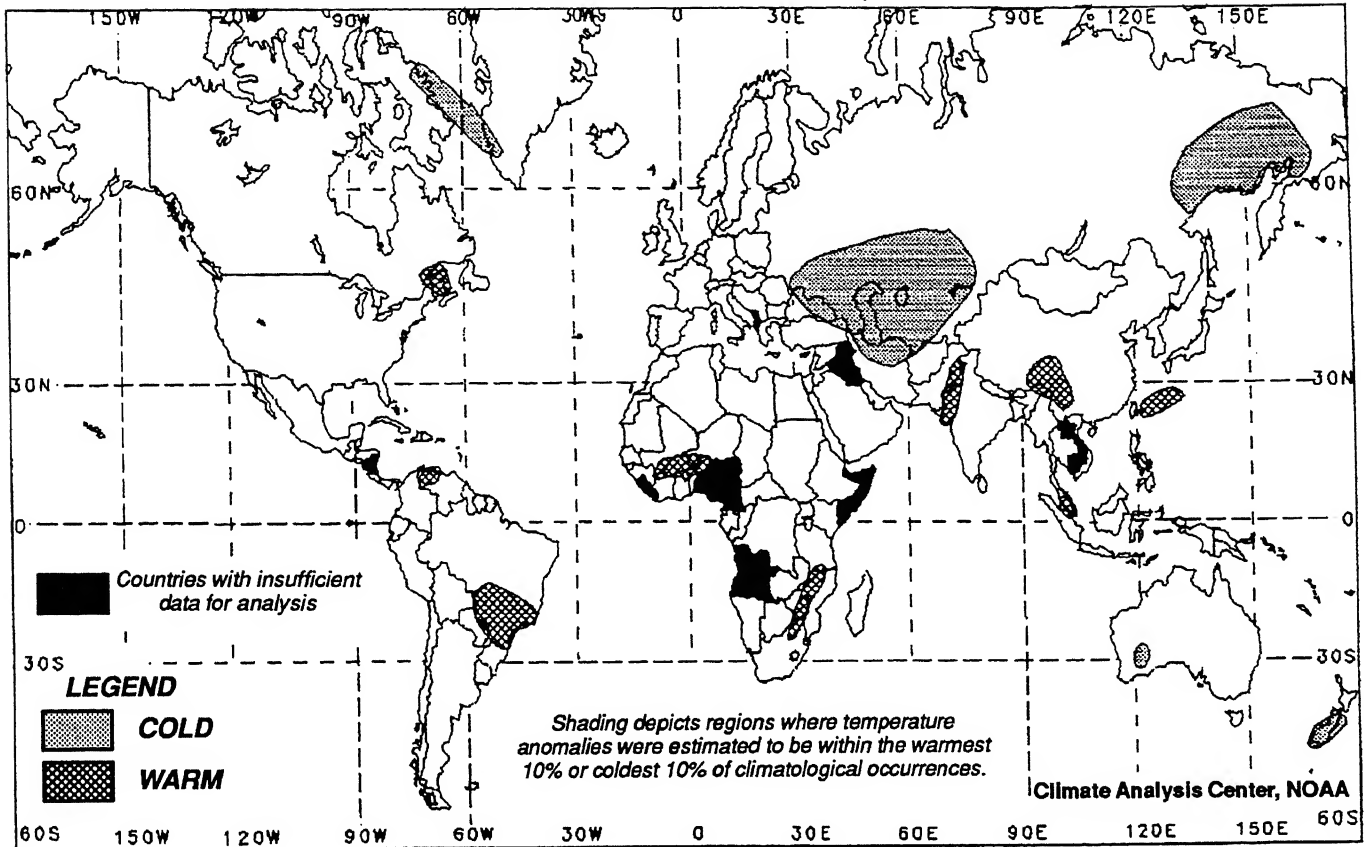
OCTOBER 31 – NOVEMBER 27, 1993





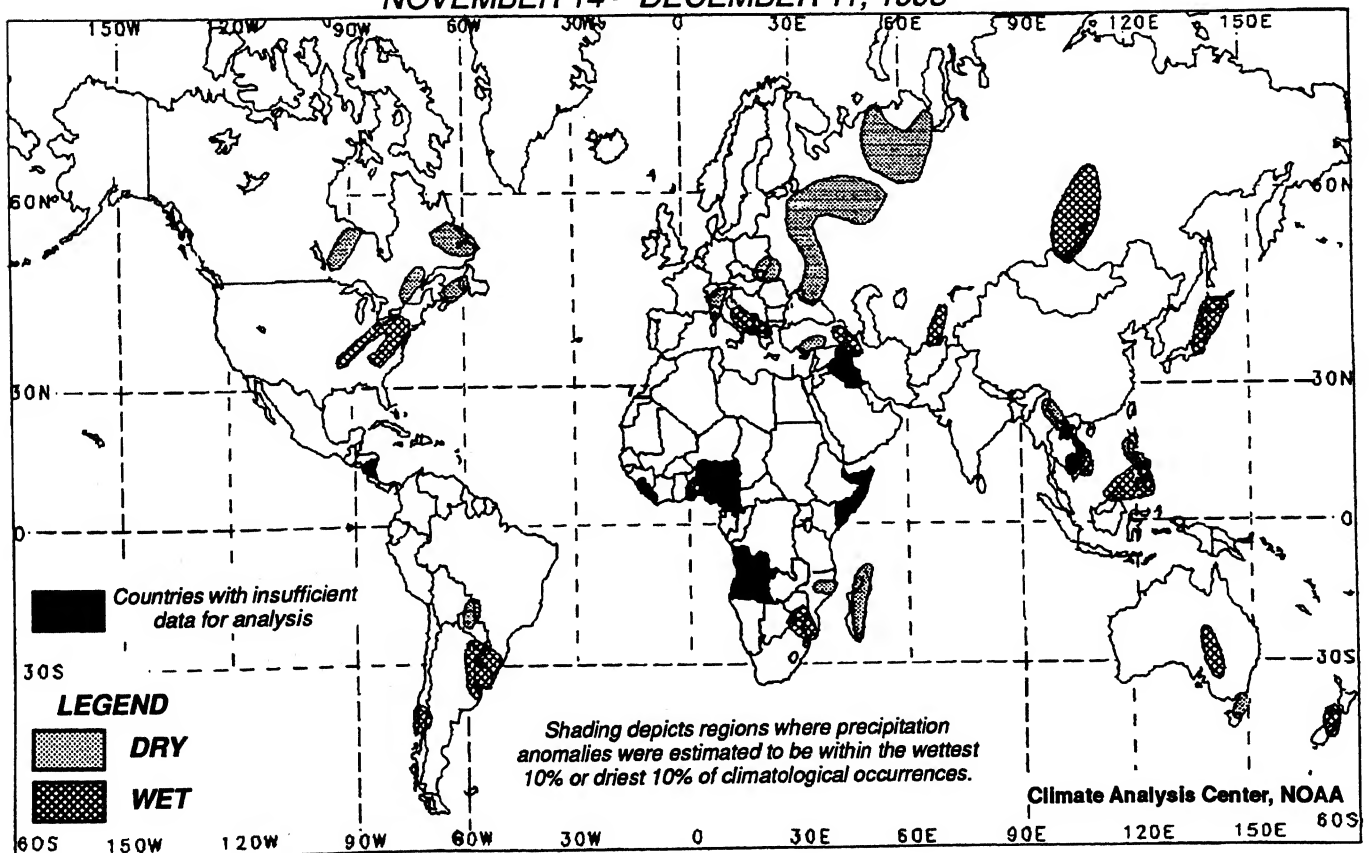
## TWO-WEEK GLOBAL TEMPERATURE ANOMALIES

NOVEMBER 28 – DECEMBER 11, 1993



## FOUR-WEEK GLOBAL PRECIPITATION ANOMALIES

NOVEMBER 14 – DECEMBER 11, 1993



# UNITED STATES MONTHLY CLIMATE SUMMARY

NOVEMBER 1993

During the first full week of November, a second round of fires, fanned by hot and dry Santa Ana winds, afflicted southern California. According to press reports, wildfires incinerated 350 homes, claimed three lives, injured more than 100 people, and scorched 18,000 acres in early November. Since the fires first broke out in late October, nineteen major blazes consumed over 1,100 buildings, claimed three lives, injured about 200 people, scorched more than 200,000 acres, and caused an estimated \$1 billion in damage. Farther east, cold Canadian air plunged southward into the nation from the Intermountain West to the Atlantic Coast, sending temperatures below freezing across the eastern two-thirds of the country, except along portions of the immediate Gulf and Atlantic Coasts. Dozens of daily record lows were set or tied as snow blanketed much of the lower Great Lakes, Ohio Valley, and Appalachians, with up to 19 inches burying parts of north-central Pennsylvania. Elsewhere, a major storm brought strong winds and heavy precipitation to Alaska's Seward Peninsula and lower Kobuk Valley. Farther south, brief but torrential rain (up to one and a half inches in one hour) caused urban and small stream flooding on parts of Oahu, HI.

A tranquil start to the second week of November was characterized by high pressure systems keeping much of the nation dry, but by mid-month, a large storm system formed in the south-central Plains, generating heavy showers and thunderstorms. Up to eight inches of rain inundated portions of southern Missouri and southern Illinois, sending creeks and small rivers out of their banks, claiming several lives, and forcing hundreds of individuals from their homes, according to press reports. Heavy rains also caused flooding in southwestern and central Indiana while a few tornadoes touched down in western and central Arkansas. Farther west, light rains fell on barren hillsides (denuded by the wildfires of previous weeks), causing mudslides in parts of southern California. Scattered rains and gusty winds also affected central and northern California. In addition, record-breaking cold spread across the much of the nation east of the Rockies as temperatures plunged into the teens as far south as northern Arkansas. By mid-November, however, southerly flow brought unseasonably warm weather to the Southeast and the Atlantic Seaboard, with several locations setting new November high temperature records (page 12).

The third week of the month featured more strong storms battering parts of the central and eastern United States. Between four and nine inches of rain soaked portions of the middle Mississippi and Ohio Valleys and central Gulf Coast while severe weather was reported at scattered locations from the southeastern Plains and lower Mississippi Valley eastward to the central Appalachians. Heavy rains sent the White and Wabash Rivers of central and southwestern Indiana out of their banks, forcing about 700 people from their homes. In addition, over 100 people fled from their homes in central Missouri as flooding occurred along the Gasconade and Big Piney Rivers. Small river and stream flooding also plagued Ohio, much of southwestern and south-central Missouri, and southeastern Louisiana. Farther south, this system spawned tornadoes that ripped through Houston, TX and Harrodsburg, KY while straight-line thunderstorm wind gusts caused damage in Brodhead, KY, Huntington, WV, and Ripley, AL. To the northeast, locally heavy lake-effect snows blanketed parts of the lee of the Great Lakes as colder Canadian air was ushered into the East on gusty northerly winds. Dry weather dominated the Far West, and winds gusting above 50 mph fanned a few new wildfires in southern California. Fortunately, all the blazes were quickly extinguished, according to press reports.

A powerful winter storm system moved across the country during the last full week of November. Blizzard conditions prevailed at numerous locations from the Pacific Northwest eastward to the upper Great Lakes and southward to the central High Plains. Up to a foot of snow blanketed the higher elevations of Montana. Meanwhile, slippery roads and near white-out conditions contributed to chain-reaction type motor vehicle accidents on highways in Washington, Utah, and Colorado. The storm disrupted Thanksgiving Eve travel across much of the country as freezing or frozen precipitation spread southward into the central and southern Plains. In addition, record low November temperatures were reported as Arctic air plunged southeastward to the Gulf of Mexico in the storm's wake (page 12). As the system trekked eastward, it tapped tropical moisture and spread torrential rains and gusty winds up the Eastern Seaboard. Streams, creeks, and rivers in

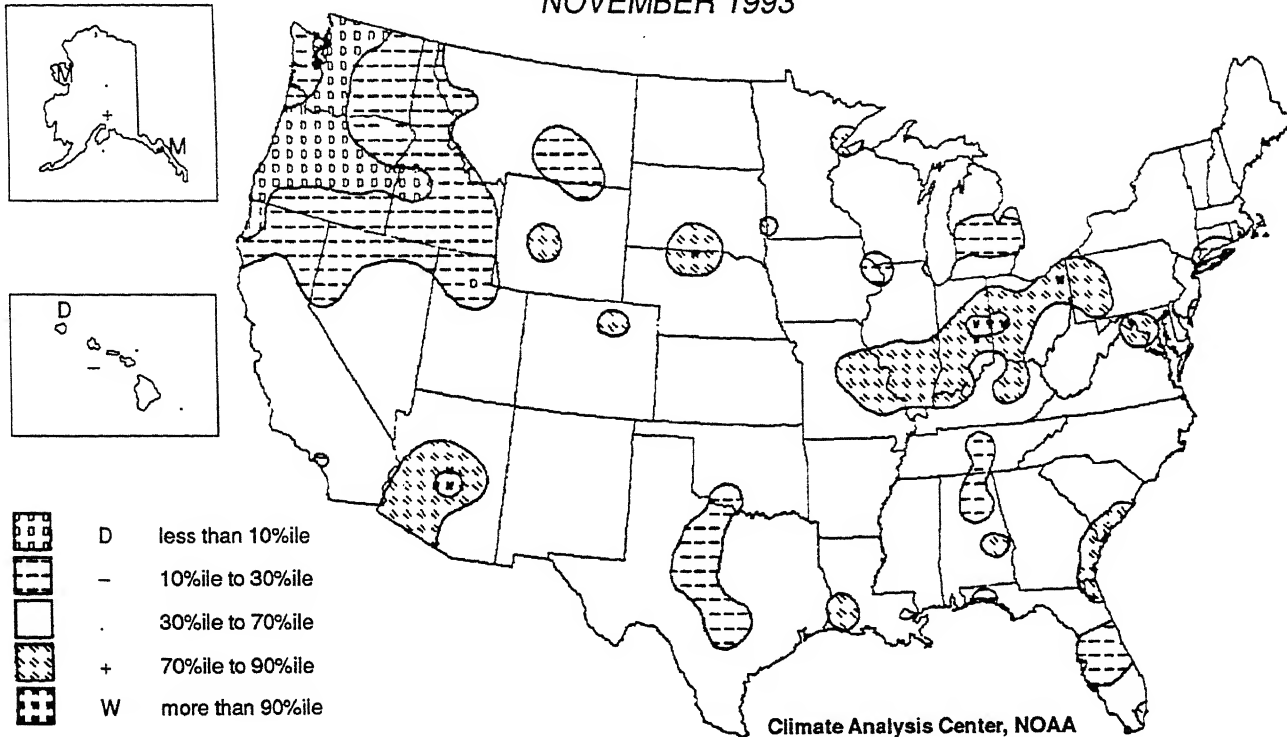
south-central Pennsylvania overflowed their banks, forcing evacuations in communities near Lancaster and York, as daily totals between four and eight inches were common across the mid-Atlantic. Washington, DC received its greatest 24-hour precipitation total in 17 years (4.03 inches), and several major roads were forced to close throughout the region. In New England, wind gusts to 68 mph toppled trees, damaged buildings, and severed power for 26,000 customers. In sharp contrast, more dry weather engendered a 400-acre forest fire near Fort Ross in northern California, and a wildfire in the southern part of the state destroyed condominiums near Anaheim Hills. The end of November featured heavy lake-enhanced snow in the Great Lakes region as the aforementioned storm pulled out to sea. Up to eight inches blanketed parts of eastern Wisconsin, extreme northeastern Illinois, northeastern Ohio, northwestern Pennsylvania, and western New York.

According to the River Forecast Centers, heavy precipitation (over four inches) drenched the South, the Ohio Valley, the Appalachians, the mid-Atlantic, and most of New England, with totals of eight to eleven inches falling on portions of southern Louisiana, southern Mississippi, southeastern Missouri, southern Illinois, eastern Indiana, and central Virginia. In addition, more than four inches of precipitation fell along the Pacific Northwest Coast and across south-central and southeastern Alaska. At least twice the normal totals were observed in the northern Plains, the central High Plains, the desert Southwest, and portions of Indiana and western Ohio (page 8). Above normal precipitation amounts were also recorded in the lower Great Basin, the central Rockies, the north-central states, the Ohio and lower Mississippi Valleys, the Appalachians, and most of Alaska. Based on preliminary calculations from the National Climatic Data Center (NCDC), five of the nine regions reported above median amounts, as did 23 of the 48 contiguous states (page 9). Indiana and Ohio reported the 3<sup>rd</sup> and 10<sup>th</sup> wettest such month, respectively, since records began in 1895. Twelve states across the Midwest, the northern Plains, and the Rockies endured one of the ten wettest January – November periods on record, primarily because of excessive rains from April through September. Three states (IA, IL, and MO) reported the wettest such period on record, and six others were among the five wettest January – November periods since 1895 (page 12).

Below normal precipitation prevailed across the Pacific Northwest, the northern Rockies, the southern Plains, parts of the east-central Great Plains and western Corn Belt, and scattered areas across the Southeast (page 8). Subnormal totals were also observed in Hawaii. Four of the nine NCDC regions reported submedian totals, with the Northwest experiencing its 7<sup>th</sup> driest November on record (page 9). Of the 48 contiguous states, 25 observed submedian amounts, with Washington and Oregon reporting the 5<sup>th</sup> and 8<sup>th</sup> driest November, respectively, in the last 99 years (page 9). Despite relatively heavy precipitation in the northern Plains and lower Midwest, the nation as a whole had the 40<sup>th</sup> driest November on record.

# PRECIPITATION PERCENTILES

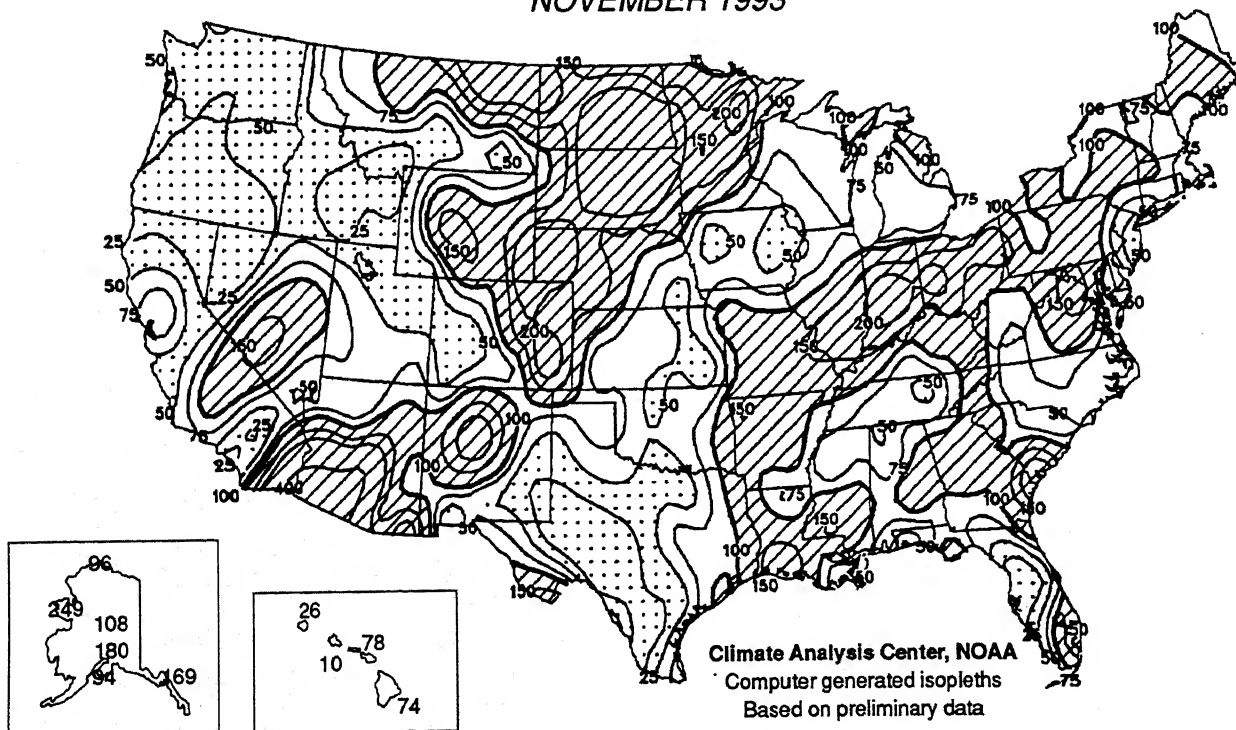
NOVEMBER 1993



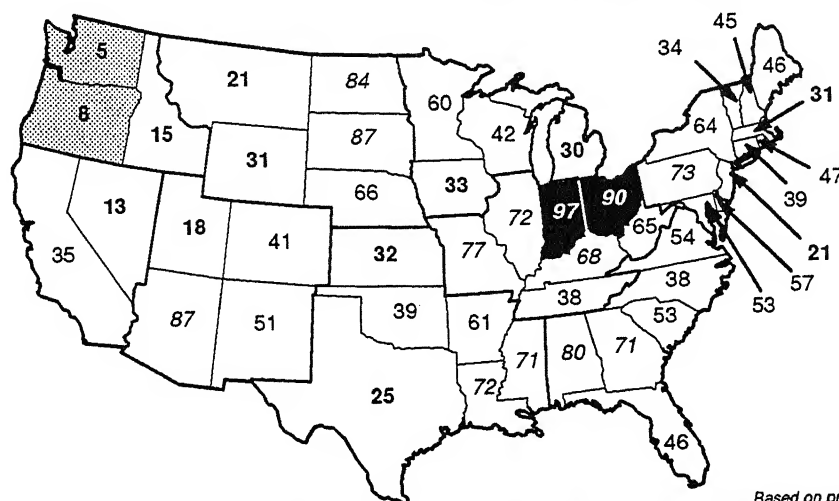
**NOVEMBER 1993 PRECIPITATION PERCENTILES**, as computed by the Climate Analysis Center. A dry month (<30%ile) was observed across the Northwest and in scattered parts of the High Plains, the southern Great Plains, the Tennessee Valley, central Michigan, and central Florida, with totals among the driest 10% of the historical distribution in parts of Oregon and Washington. Climatologically significant wetness (>70%ile) was limited to parts of the Ohio Valley, the Midwest, and Arizona.

# PERCENT OF NORMAL PRECIPITATION

NOVEMBER 1993



## HISTORICAL PRECIPITATION RANKINGS BY STATE NOVEMBER 1993



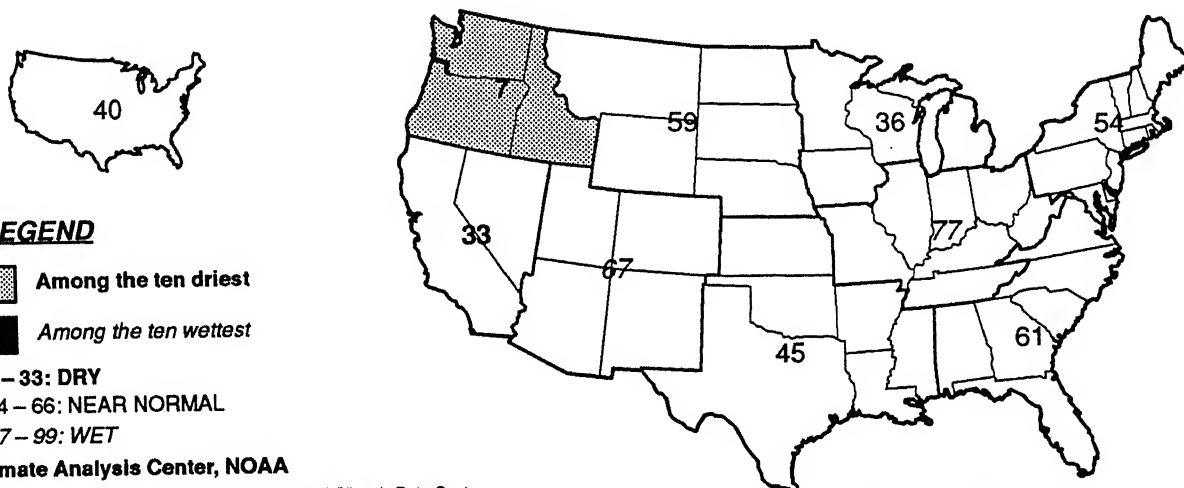
### LEGEND

- Among the ten driest
- Among the ten wettest
- 1 – 33: DRY
- 34 – 66: NEAR NORMAL
- 67 – 99: WET

Climate Analysis Center, NOAA

Based on preliminary data generated by the National Climatic Data Center  
This chart depicts the ranking of the specific parameter, as measured during the period indicated, with respect to all other such periods on record since 1895.

## HISTORICAL PRECIPITATION RANKINGS BY REGION AND NATION NOVEMBER 1993



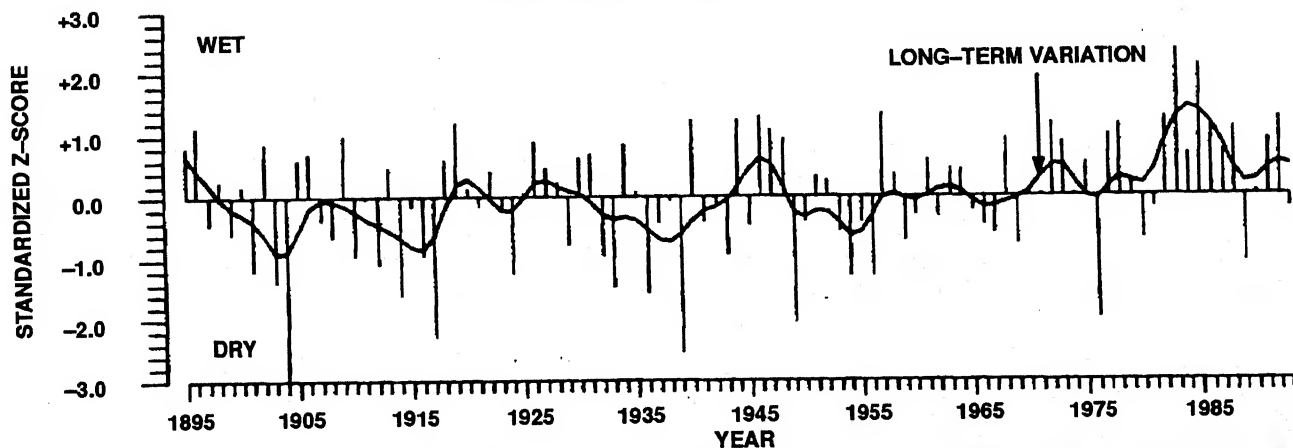
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## U. S. NATIONAL NORMALIZED PRECIPITATION INDEX NOVEMBER 1895 – 1993

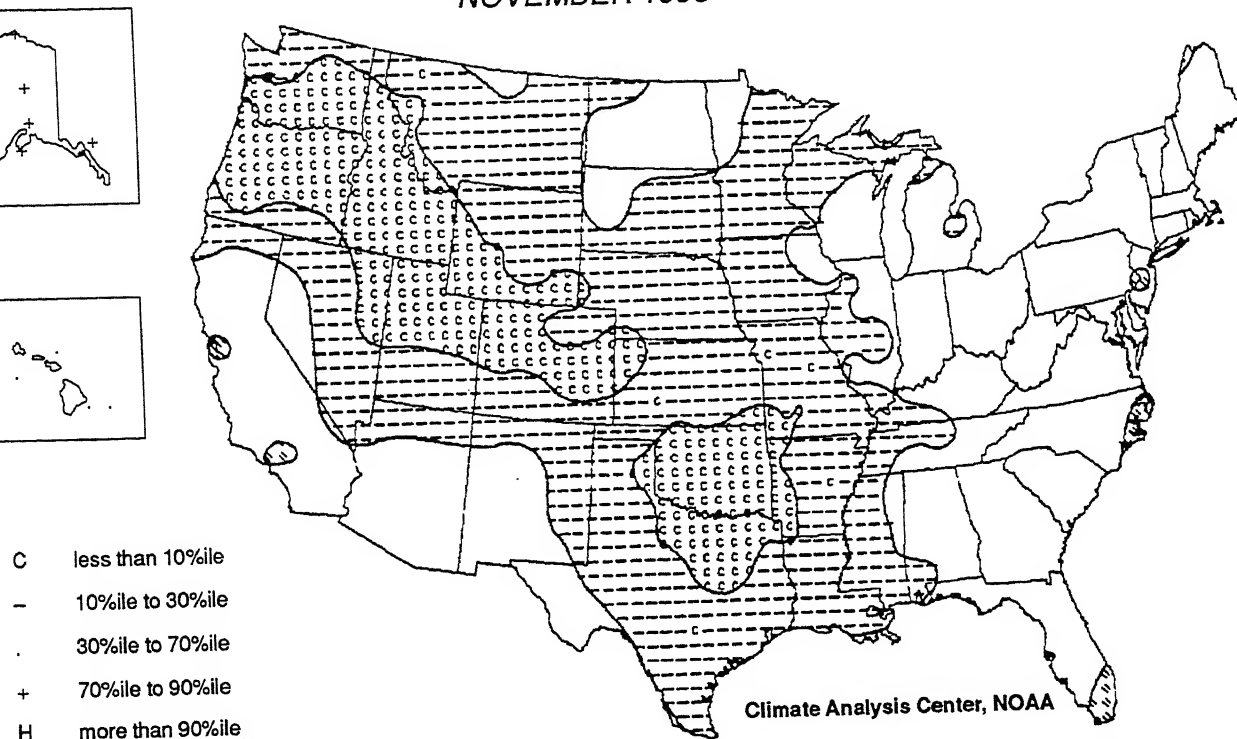


National Climatic Data Center, NOAA

NATIONAL MEAN NOVEMBER 1993 PRECIPITATION INDEX, as computed by the National Climatic Data Center. November 1993 was the 40<sup>th</sup> driest such month on record. This index takes local normals into account so that regions with large precipitation amounts do not dominate the index value.

# TEMPERATURE PERCENTILES

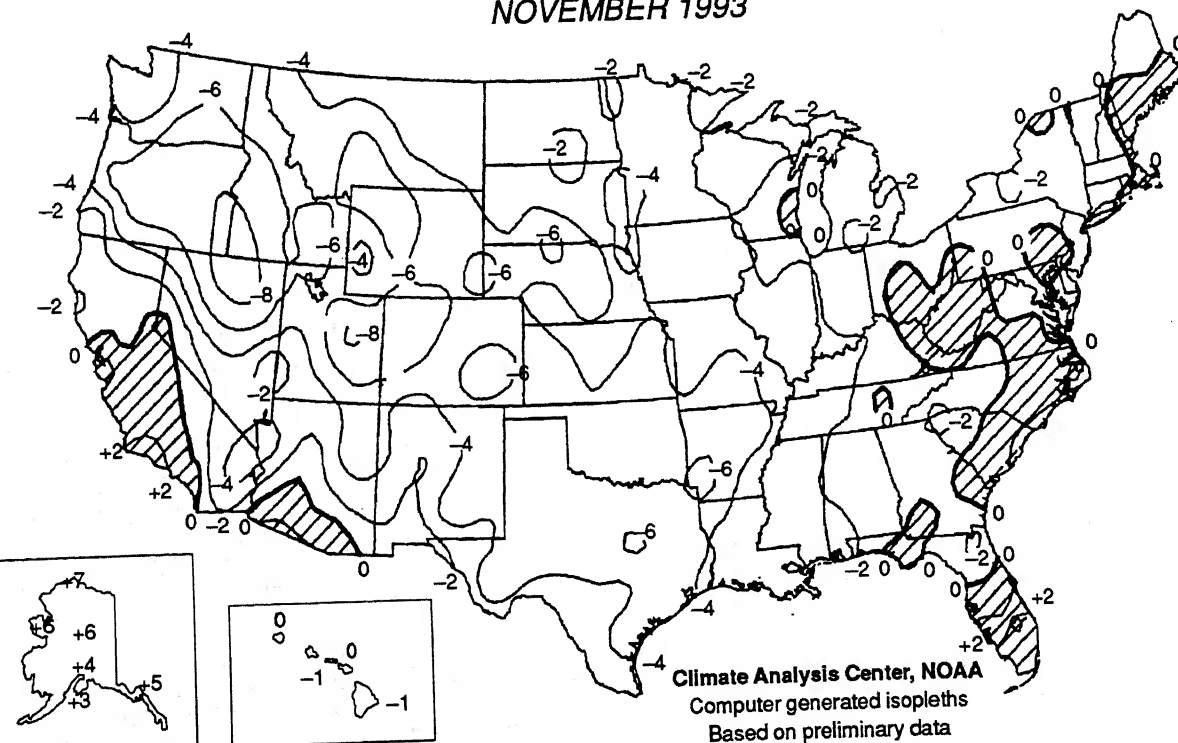
NOVEMBER 1993



**NOVEMBER 1993 TEMPERATURE PERCENTILES**, as computed by the Climate Analysis Center. Unusually cold weather (<30%ile) dominated much of the western and central United States, with monthly mean temperatures among the coldest 10% of the 1961-1990 historical distribution across much of the Pacific West, central Rockies, and southern Plains. Abnormally warm conditions (>70%ile) were limited to small areas along the central and southern East Coast.

## DEPARTURE OF AVERAGE TEMPERATURE FROM NORMAL (°F)

NOVEMBER 1993

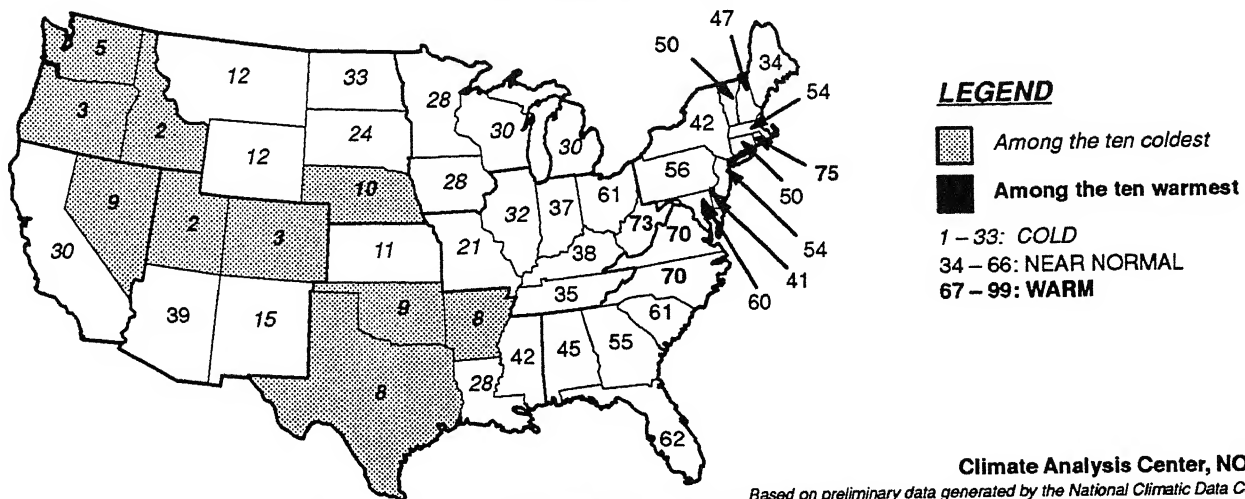


**NOVEMBER 1993 DEPARTURE OF AVERAGE TEMPERATURE FROM NORMAL (°F)**. Shaded areas experienced above normal temperatures. Warmer than normal conditions covered most of the nation from the Pacific Ocean eastward to the Appalachians and northeastward to western New England, with temperatures below -4°F across most of the West and the southern Plains. In contrast, unusually high temperatures were limited to parts of California and Arizona and portions of the Eastern Seaboard.



## HISTORICAL TEMPERATURE RANKINGS BY STATE

NOVEMBER 1993



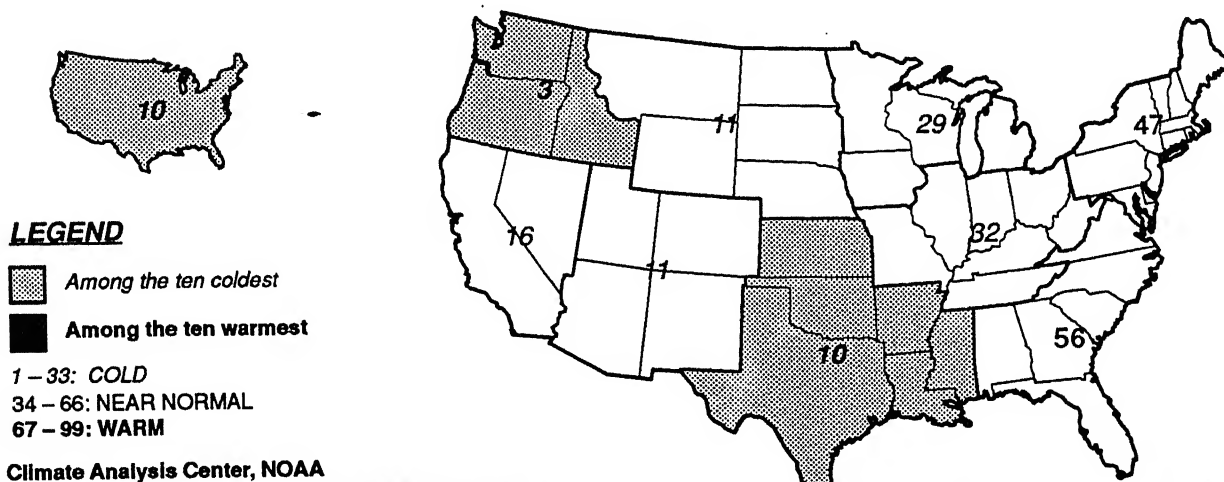
Climate Analysis Center, NOAA

Based on preliminary data generated by the National Climatic Data Center

This chart depicts the ranking of the specific parameter, as measured during the period indicated, with respect to all other such periods on record since 1895.

## HISTORICAL TEMPERATURE RANKINGS BY REGION AND NATION

NOVEMBER 1993



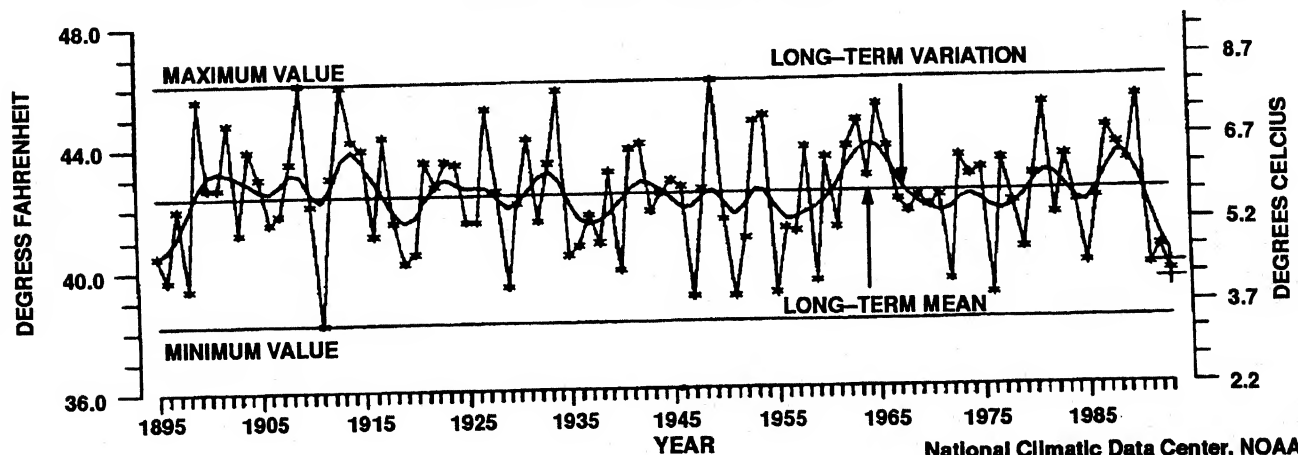
Climate Analysis Center, NOAA

Based on preliminary data generated by the National Climatic Data Center

This chart depicts the ranking of the specific parameter, as measured during the period indicated, with respect to all other such periods on record since 1895.

## U. S. NATIONAL TEMPERATURE

NOVEMBER 1895 - 1993



**NATIONALLY AVERAGED NOVEMBER 1895-1993 TEMPERATURES**, as computed by the National Climatic Data Center. November 1993 was the 10<sup>th</sup> coldest such month on record, and the third successive November to average at least 2°F colder than normal nationally. The index was dominated by an extensive area of submedian temperatures across the western and central United States.

### TABLE 1. RECORD NOVEMBER PRECIPITATION

STATION	TOTAL (IN)	NORMAL (IN)	PCT. OF NORMAL	RECORD TYPE	RECORDS BEGAN
ATLANTA, GA	5.26	2.19	240.2	HIGHEST	1945

NOTE: Trace precipitation is considered ZERO precipitation. Stations with no precipitation are only included if normal precipitation is 0.25 inches or more.  
\*\*\*\*\* - Percent of normal not calculable.

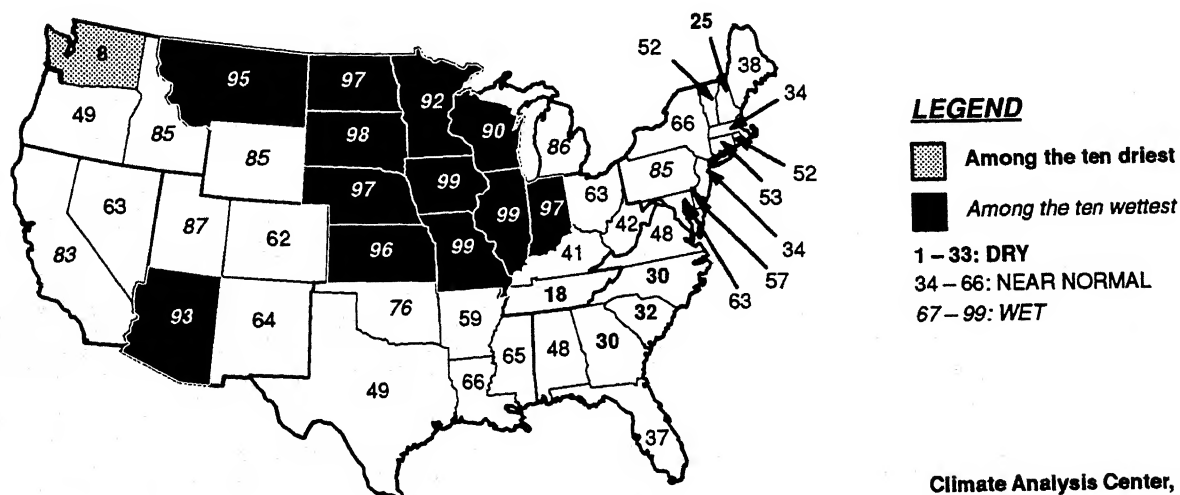
### TABLE 2. RECORD NOVEMBER AVERAGE TEMPERATURES

STATION	DEPARTURE (°F)	AVERAGE (°F)	NORMAL (°F)	RECORD TYPE	RECORDS BEGAN
No Record November Average Temperatures Observed					

### TABLE 3. RECORD NOVEMBER EXTREME TEMPERATURES

STATION	EXTREME (°F)	DATE OCCURRED	RECORD TYPE	RECORDS BEGAN
CHARLESTON, WV	85	November 14	HIGHEST	1948
WHEELING, WV	82	November 14	HIGHEST	1962
PHILADELPHIA, PA	81	November 15	HIGHEST	1941
NEW YORK/LAGUARDIA, NY	80	November 15	HIGHEST	1941
BOSTON, MA	78	November 15	HIGHEST	1936
NEWPORT, CT	78	November 15	HIGHEST	1948
PROVIDENCE, RI	78	November 15	HIGHEST	1954
KELLEY, WV	78	November 14	HIGHEST	1963
SAVANNAH, GA	60	November 1	HIGHEST	1944
WYNNSVILLE, TX	31	November 28	LOWEST	1937
DALLAS CHRISTI, TX	28	November 28	LOWEST	1939
SACRAMENTO, CA	26	November 25	LOWEST	1940
AUSTIN, TX	13	November 26	LOWEST	1949
BOZEMAN, MT	-7	November 24	LOWEST	1939
BOULDER, CO	-8	November 24	LOWEST	1935
BOZEMAN, MT	-14	November 26	LOWEST	1950
BOZEMAN, MT	-16	November 24	LOWEST	1935

## HISTORICAL PRECIPITATION RANKINGS BY STATE JANUARY - NOVEMBER 1993



Climate Analysis Center, NOAA

Based on preliminary data generated by the National Climatic Data Center

This chart depicts the ranking of the specific parameter, as measured during the period indicated, with respect to all other such periods on record since 1895.

# EL NIÑO/SOUTHERN OSCILLATION (ENSO) DIAGNOSTIC ADVISORY 93/11

ISSUED BY

DIAGNOSTICS BRANCH  
CLIMATE ANALYSIS CENTER/NMC

December 10, 1993

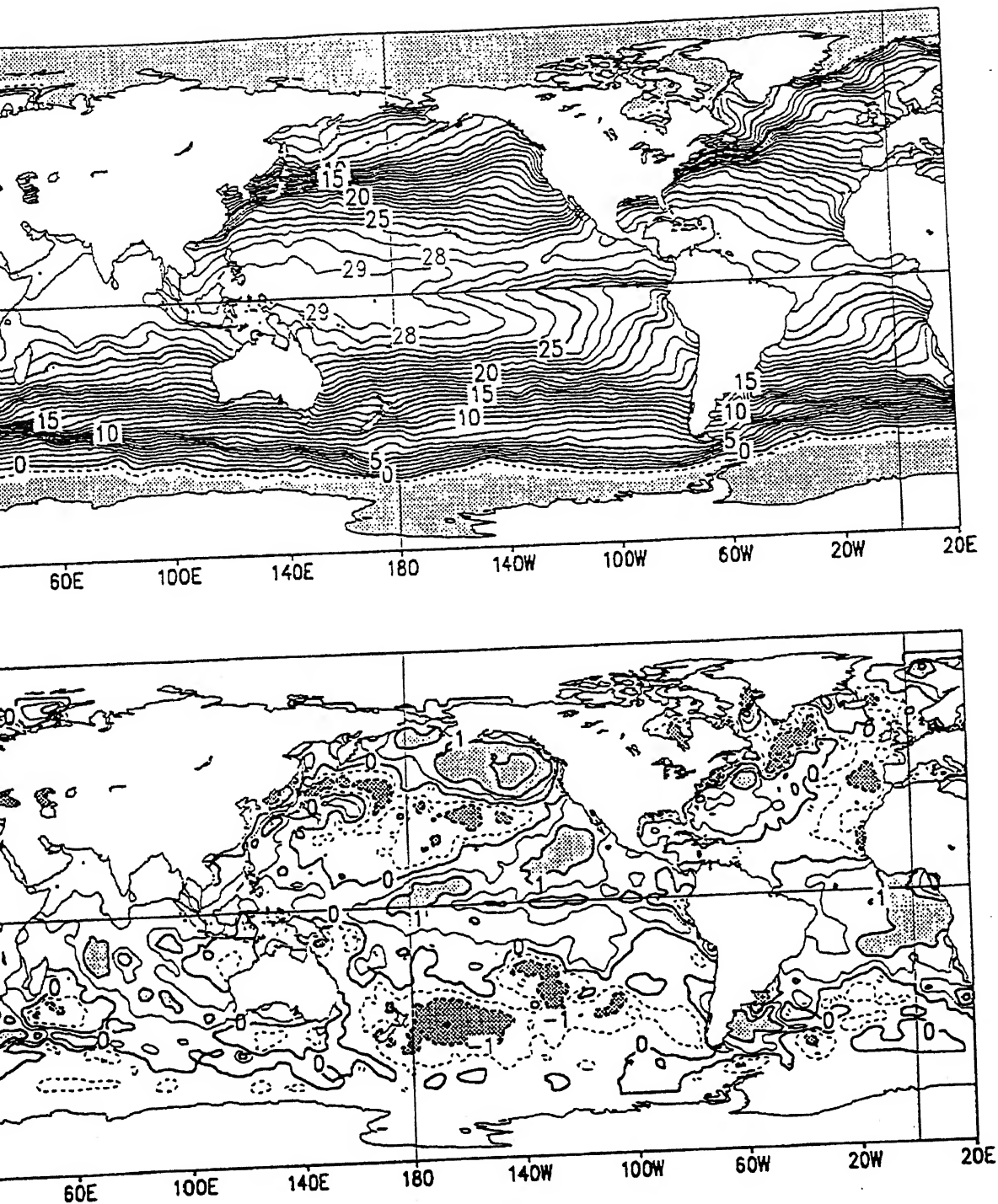
Lingering weak warm episode conditions, featuring warmer than normal SSTs and weaker than normal low-level easterlies, continued in the tropical Pacific during November. Positive sea surface temperature (SST) anomalies greater than  $0.5^{\circ}\text{C}$  dominated the tropics during November (Fig. 1). This pattern of SST anomalies is quite similar to that observed during November 1992, with the magnitude of the anomalies being slightly greater this year. Consistent with this pattern of tropical SST anomalies, weaker than normal low-level easterlies were found throughout the central and eastern tropical Pacific. However, in contrast to these indications of continuing warm episode conditions, convection in the central equatorial Pacific was near normal and the Southern Oscillation Index was near zero in November.

The depth of the oceanic thermocline, as measured by the depth of the  $20^{\circ}\text{C}$  isotherm, was less than normal in the western tropical Pacific and slightly greater than normal in the eastern tropical Pacific during November. Subsurface equatorial temperature anomalies, in the vicinity of the thermocline, were slightly positive east of  $160^{\circ}\text{W}$  and near  $-2^{\circ}\text{C}$  in the

western Pacific. A Kelvin wave, initiated during August, reached the South American coast in late October, resulting in a brief increase in SST anomalies along the coast. A second, and apparently weaker Kelvin wave, developed in late October, and its effects (a deepening of the oceanic thermocline) reached the vicinity of  $130^{\circ}\text{W}$  by mid-November.

As in the past three years, positive sea level pressure (SLP) anomalies continued to be observed in the western tropical Pacific and over portions of Indonesia, as well as over the tropical Atlantic. However, only a small portion of the eastern tropical Pacific experienced negative SLP anomalies.

The overall pattern of SST anomalies, together with the persistent weak low-level easterlies, suggests the redevelopment of warm during the boreal winter.



**FIGURE 1.** Sea surface temperature, a) mean (blended analysis) and b) anomalous, for November 1993. Mean SST contour interval is 2°C. Temperatures > 20°C are contoured every degree with odd contours dashed. Anomalies are computed as departures from the COADS/ICE climatology (Reynolds 1988, *J. Climate*, 1, 75–86). Anomaly contour interval is 1°C and negative contours are dashed.

